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CHEMICAL & ENGINEERING NEWS

C&EN

OCTOBER 10, 1994

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# DNA PROFILING

**Technology enters mainstream despite persistent controversy**

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CHEMICAL & ENGINEERING NEWS

C&EN

OCTOBER 10, 1994

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# LETTERS

## Explosives disposal

I am writing in response to the Science/Technology Concentrate "Incineration of explosives poses threat to atmosphere" (C&EN, Aug. 15, page 33), which reports on research to be presented by Jehuda Yinon and Richard Yost. The article quite rightly points out the serious environmental impact that would result if the large quantities of obsolete explosives now being considered for demilitarization in the U.S. and abroad were to be dumped, buried, burned, or detonated in the open air. Other techniques of disposal, such as bacterial transformation and supercritical water degradation, are still in an early experimental stage. The authors "aim to determine whether combustion of explosives under different conditions can eliminate toxic product formation."

Although burning explosives in a poorly controlled manner can indeed produce incomplete combustion products, this operation, performed under proper conditions in a modern incinerator, produces no more hazardous products than incinerating other materials.

However, detonation of explosives under controlled conditions produces very much smaller quantities of undesirable products than controlled burning in an incinerator. Thus, large quantities of obsolete explosives (and propellants) can be disposed of quickly and effectively and in an environmentally and economically beneficial manner by including these energetic materials as active ingredients in commercial explosives that are designed to be oxygen-balanced to produce minimal quantities of unwanted reaction products.

The chemical reactions taking place in the high-pressure and moderate-temperature conditions prevalent in the detonation combustion of such explosives in large (8–15-inch diameter) drillholes in rock provide ideal conditions for achieving complete reaction. Such detonations produce the acceptable reaction products carbon dioxide, water, and nitrogen, with far less production of carbon monoxide, nitrogen oxides, hydrocarbons, and soot than the exhaust from modern automobiles and trucks.

Commercial explosives are used in the U.S., Russia, and Ukraine in quantities (2 million metric tons per year in the U.S. alone) that make the surplus quantities of demilitarized explosives seem almost trivial and make their addition in small percentages relatively easy.

The available quantities of explosives and propellants to be demilitarized really represent a considerable asset to the country and its taxpayers. Why waste the value of these products when many of them can be used in an acceptable and profitable manner as components in commercial explosives as indicated? New Mexico Tech is currently seeking funding for a research program to support safe operation in large-scale mining with explosives containing demilitarized materials. Several private companies are pursuing this approach to reuse of the large quantity of bulk explosives and propellants becoming excess, both here and in the former Soviet Union.

Major portions, but not all, of demilitarized energetic materials are suitable for reuse this way. A small fraction of the total amount of these materials contains metal compounds, toxic smokes or dyes, or other components that must be recovered or are difficult to destroy. These are candidates for the high-cost technologies currently being developed and tested, such as supercritical water oxidation.

**Douglas B. Olson**
**Per Anders Persson**
*Research Center for Energetic Materials*
*New Mexico Tech*
*Socorro*

## Oversupply of chemists

It is refreshing to see that the American Chemical Society has finally faced the reality of the oversupply of chemists, particularly of those at the doctoral level. Attila E. Pavlath has laid out the problem (C&EN, Sept. 12, page 46), but I submit that the solution is not likely to come from the society because the major groups that control the society—academic research universities and the chemical industry—find it in their own self-interest to keep the status quo.

How can major research universities perpetuate themselves without hordes of graduate students to do the teaching and to contribute their labor to produce publications that enhance the reputation of their mentors? Universities depend upon grants for the overhead they contribute, and, thus, a catch-22 situation results. In addition, everyone knows there are too

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# Foreign share in U.S. chemicals rises again

Foreign companies have long invested in the U.S. chemical industry. The reasons they give include the large homogeneous market represented by the U.S., an educated work force, and a relatively stable labor-management relationship compared with those in many other countries.

According to the latest survey of foreign investment in the U.S. by the Commerce Department, ownership of the U.S. chemical industry by overseas companies increased almost 7.5% last year from 1992. This brings book value of those foreign-owned assets to $57.7 billion. The government calculates book value on a historical cost basis—the price paid for the assets at the time of their purchase rather than their value today.

According to the Commerce Department data, of all U.S. industry, the chemicals and allied products industry is second only to wholesale trade in terms of foreign investment. And among manufacturing industries, it has by far the largest foreign investment, almost double that for second-place machinery manufacturing.

In terms of the overall picture, the chemicals and allied products sector accounts for about 12% of foreign investment in all U.S industry and 35% of foreign investment in manufacturing companies.

And investment in chemicals and allied products continues to grow at a rate faster than those for other sectors of the economy. Between 1989 and 1993, foreign investment in chemicals grew at an average annual rate of 11%. This compares with an annual growth rate for all manufacturing of just 2.5% during the same period. And foreign investment in all industry—which includes service, financial, and petroleum sectors, as well as manufacturing—increased at an average annual rate of 4.8%.

The same pattern holds true for growth in 1993, when investment in chemicals and allied products grew 7.5% from 1992. Growth for foreign investment in manufacturing increased just 2.1% and for all industry, a much lower 4.6%.

The driving force behind the growth for chemicals in the past few years has been the worldwide consolidation of the pharmaceutical industry.

Led by deals such as the acquisition of SmithKline by Beecham of the U.K., Hoechst's acquisition of a majority of generic drugmaker Copley, and Rhône-Poulenc's acquisition of a large part of Rorer Group, foreign investment in the drug sector of the U.S. chemical industry has swelled. In 1989, the drug sector, with foreign investment of less than $9 billion, held second place in foreign investment; the third-place category was soaps, cleaners, and toilet goods at $3.6 billion in investment. However, since then, double-digit annual growth of 17.5% has almost doubled the book value of pharmaceutical investment to about $17.1 billion in 1993, increasing its lead to $10.1 billion ahead of soaps.

The largest chemical sector for foreign investment is still industrial chemicals and synthetics, just as it is the largest sector of the U.S. chemical industry. But growth of foreign investment in industrial chemicals has been slow. Between 1989 and 1993, average annual growth of book value was just 3.9% per year, bringing the value to $27.0 billion in 1993. In 1993, annual growth of 4.0% was essentially the same as the average over the past few years.

In other subcategories, investment in soaps grew at an average annual rate of 6.8% from 1989 to 1993, but was up only 2.6% from 1992 to 1993 to finish at $6.96 billion.

The agricultural chemicals sector was the star performer in terms of growth, but it was from a very small base. Agricultural chemicals ended 1993 with foreign investment of $685 million, up 32% from 1992 and up an average of 35% per year since 1989. However, investment in agricultural chemicals represented only slightly more than 1% of the total chemical investment last year.

As in the past, European companies are by far the dominant force in investing in the U.S. chemical industry. The value of chemical holdings by European companies in 1993 totaled $51.4 billion, or almost 90% of total foreign investment in chemicals and allied products.

Traditionally, companies from the U.K. have held first place in investment, and 1993 was no exception. The book value of U.K. investment last year totaled $17.5 billion, or 30% of all foreign investment in the U.S. chemical industry. The U.K. was followed by Germany at $10.4 billion and the Netherlands at $8.64 billion.

Because of disclosure rules, the Commerce Department did not total investment for other geographic areas, except for "Latin America and other Western Hemisphere" countries, excluding Canada. U.S. chemical industry investment from countries in that group totaled $1.25 billion, or just 2.2% of the aggregate.

Although not disclosing a total for the Asia-Pacific region, the survey showed that Japanese investment in the U.S. chemical industry totaled $3.31 billion in 1993 and put investment from Taiwan at $238 million.

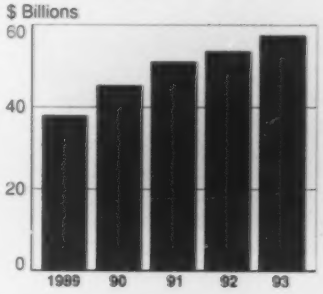
*William Storck*

**Industrial chemicals get biggest investment share**

Total 1993 foreign investment in U.S. chemicals = $57.7 billion

Source: Department of Commerce

**Overseas investment in chemicals up 50% since '89**




Source: Department of Commerce